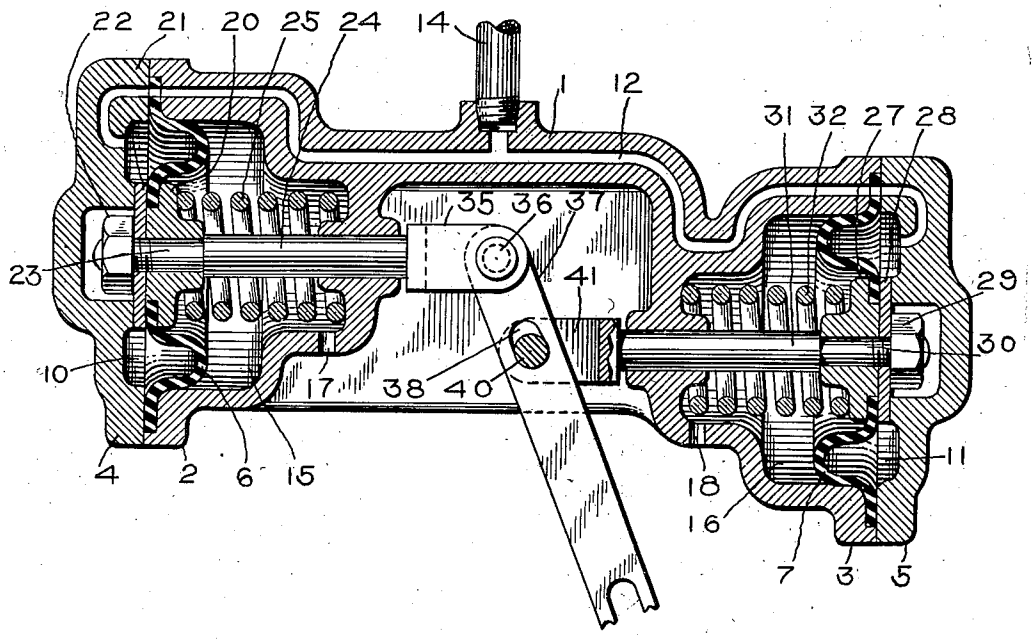
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FLUID PRESSURE MOTOR

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FLUID PRESSURE MOTOR

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This invention relates to fluid pressure motors and more particularly to the type employing movable actuating abutments in the form of flexible diaphragms.

Flexible disk like diaphragms made from rubber composition and having molded therein suitable reinforcing fabric having been developed to withstand high fluid pressures such as encountered in certain fluid pressure controlled devices. In fluid pressure motors diaphragms of this type have been advantageously employed where it is desired to obtain movement of a control element upon small variations in control pressure. Unlike ringed pistons however, the movement or deflection of such diaphragms must be limited in order to avoid the overstressing of the diaphragms and possible consequent premature failure thereof. Where it is desired to move a control element a greater distance than is practicable to attain by the deflection of an operating diaphragm without danger of damage to the diaphragm, it has been necessary to resort to a ringed piston and due to the friction between the ring and the bore in which it operates, variations in the increments of pressure for operation must necessarily be increased.

The principal object of the invention is the provision of an improved fluid pressure motor of the diaphragm type which operates on small variations in pressure and which is so constructed as to provide for the long travel of the element to be actuated without overstressing the diaphragm structure.

Other objects and advantages will appear from the following more detailed description of the invention.

In the accompanying drawing, the single figure is a sectional view showing a fluid pressure motor embodying the invention.

As shown in the drawing the fluid pressure motor may comprise a horizontally disposed casing portion 1 having a pair of spaced downwardly projecting body portions 2 and 3 which are open at opposite ends, and may further comprise a pair of cap members 4 and 5 for closing the open ends of the body portions 2 and 3, respectively.

Clamped between the body portion 2 and the cap member 4 is a flexible diaphragm 6 and clamped between the body portion 3 and the cap member 5 is a similar flexible diaphragm 7, which diaphragms in the present embodiment of the invention have been shown as being of substantially the same area.

At one side of diaphragm 6 there is a chamber 10 and at one side of diaphragm 7 there is a chamber 11 which chambers are connected together by means of a passage 12 which in turn is connected to a pipe 14.

At the opposite side of diaphragm 6 there is a chamber 15 and at the opposite side of diaphragm 7 there is a chamber 16 which chambers are in constant open communication with the atmosphere by way of passages 17 and 18, respectively.

The diaphragm 6 is clamped between a diaphragm follower 20 contained in chamber 15 and a diaphragm follower 21 contained in chamber 10 at the opposite side of the diaphragm, by means of nut 22 having screw-threaded connection with a stud portion 23 carried at one end of a stem or rod 24, which stud portion passes through a suitable central opening in the followers 20 and 21. The stem or rod 24 passes through chamber 15 and extends through a suitable opening in the end wall of the chamber to the exterior thereof. Contained in chamber 15 and surrounding the stem or rod 24 is a spring 25 which, at all times, tends to urge the diaphragm assemblage including diaphragm 6, follows 20 and 21 and stem or rod 24 in a direction toward the left hand as viewed in the drawing.

The diaphragm 7 is clamped between a diaphragm follower 27 contained in chamber 16 and a diaphragm follower 28 contained in chamber 11 at the opposite side of the diaphragm, by means of a nut 29 having screw-threaded connection with a stud portion 30 carried at one end of a stem or rod 31, which stud portion passes through a suitable central opening in the followers 27 and 28. The stem or rod 31 passes horizontally through chamber 16 and extends through a suitable opening in the end wall of the chamber to the exterior thereof. Contained in chamber 16 and surrounding the rod or stem 31 is a spring 32 which at all times, tends to urge the diaphragm assemblage including diaphragm 7, followers 27 and 28 and stem or rod 31 in a direction toward the right hand as viewed in the drawing.

The outer end of rod or stem 24 is provided with a jaw 35 which is connected by means of a pin 36 to one end of a lever 37 which projects into the space between the body portions 2 and 3. The lever 37 is provided with a slotted opening 38 which extends longitudinally of the lever and is disposed nearer to the end of the lever connected to the jaw 35 than to the opposite end of the lever. Contained in the slotted opening 38 of the lever 37 is a pin 40 which is carried by a

jaw 41 provided at the outer end of the stem or rod 31.

In use, with chambers 10 and 11 at atmospheric pressure the springs 25 and 32 act to maintain the diaphragm assemblies in the body portions 2 and 3, respectively, and thereby the lever 37, in the position in which they are shown in the drawing.

If fluid under pressure is supplied to pipe 14 it flows therefrom to chambers 10 and 11 by way of passage 12. Fluid under pressure thus supplied to chamber 10 acts on diaphragm 6 in opposition to that of spring 25 and fluid under pressure supplied to chamber 11 acts on diaphragm 7 in opposition to that of spring 32. When the pressure of fluid in these chambers and acting on diaphragm 6 and 7 has been increased to a degree sufficient to overcome the opposing force of springs 25 and 32 the diaphragm 6 will be caused to deflect in a direction toward the right hand while the diaphragm 7 will be caused to deflect in a direction toward the left hand.

The diaphragm 6 as it deflects in a direction toward the right hand, causes the rod 24 to move in the same direction, and the diaphragm 7 as it deflects in a direction toward the left hand, causes the rod 31 to move in the same direction. As the rods 24 and 31 are thus moved in opposite directions, the force transmitted through the rods acts on opposite sides of the lever 37 causing said lever to pivot about the pins 36 and 40 to actuate the lever 37 in a clockwise direction.

It should here be noted that both diaphragms operate to move the rods 24 and 31 in opposite directions, and since the rods are operatively connected to the lever at different positions along its length each diaphragm as it is deflected functions to increase the distance of travel of the lever 37. From this it will be seen that the distance of travel of the lever will be considerably greater than the distance each diaphragm deflects. By reason of this arrangement pistons or impracticable diaphragms need not be resorted to in order to move the lever a relatively long distance.

When fluid under pressure is released from chambers 10 and 11 by way of passage 12 and pipe 14 the springs 25 and 32 act to cause the diaphragms 6 and 7 to deflect in opposite directions to thereby move the rods 24 and 31 and the connected lever 37 to the position in which they are shown in the drawing.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A fluid pressure motor comprising a casing, a pair of flexible diaphragms disposed in said casing, one of said diaphragms being provided for deflection in one direction and the other of said diaphragms being provided for deflection in the opposite direction upon the supply of fluid under pressure simultaneously thereto, means for conducting pressure fluid simultaneously to the diaphragms, a floating lever, means for operatively connecting one of said diaphragms to said lever at one place between the ends of the lever, and other means for operatively connecting the other of said diaphragms to said lever at a different place between the ends of said lever both of said means being operative upon a deflection of said diaphragms for actuating said lever.

2. A fluid pressure motor comprising a casing having a pair of spaced body portions, a pair of flexible diaphragms, one of said diaphragms being disposed in one of said body portions and being arranged for deflection in one direction the other of said diaphragms being disposed in the other of said body portions and being arranged for deflection in the opposite direction upon the supply of fluid under pressure simultaneously thereto, means for conducting pressure fluid simultaneously to the diaphragms, a floating lever having one of its end portions extending into the space between said body portions, and means operatively connecting said diaphragms to said end portion of the lever at different places in the direction of the length of the lever, said means being operative upon deflection of said diaphragms for actuating said lever.

3. A fluid pressure motor comprising a casing, a pair of flexible diaphragms disposed in said casing and provided for deflection in a direction toward each other upon the supply of fluid under pressure simultaneously thereto, means for conducting pressure fluid simultaneously to the diaphragms, a floating lever having one end portion disposed between said diaphragms, and means operatively connecting said diaphragms to said lever for effecting actuation of said lever upon deflection of said diaphragms.

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